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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/565,773	08/17/2006	Otto Erik Sielcken	4662-135	3000
23117 7590 07/16/2008 NIXON & VANDERHYE, PC 901 NORTH GLEBE ROAD, 11TH FLOOR ARLINGTON, VA 22203			EXAMINER CUTLIFF, YATE KAI RENE	
			ART UNIT 1621	PAPER NUMBER
			MAIL DATE 07/16/2008	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/565,773	<b>Applicant(s)</b> SIELCKEN ET AL.	
	<b>Examiner</b> YATE K. CUTLIFF	<b>Art Unit</b> 1621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 07 April 2008.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-9 & 11-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 and 11-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 January 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Response to Amendment***

#### In the Specification:

1. The Amendment to the Specification filed April 7, 2008 has been fully considered. The objection to the Specification has been withdrawn.

#### In the Claims

2. The indication of allowability of the subject matter of claim 10 (currently cancelled) and claims 11-15 is withdrawn. After final consideration withdrawal of the subject matter previously indicated allowable are not allowable in view of the previously cited references as set forth in the Office Action of December 14, 2007; and further in view of a new reference Dent et al. (US 5,350,867)(Dent 2). Prior to this time the second Dent et al. reference had not been considered. Rejection based on the new consideration of the prior art in view of the new reference follow.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 1621

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1-9 and 11-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over in Sielcken et al. (US 5,495,041) in view of Drent et al. (WO 02/26690) (Drent 1) and Drent (US 5,304,674) (Drent 2)

7. The rejected claims, inter alia, covers a process for the carbonylation of a conjugated diene comprising; reacting a conjugated diene by reacting the conjugated diene with carbon monoxide and a hydroxyl group-containing compound in the presence of a palladium catalyst system in a reaction zone to produce a reaction mixture, said catalyst system comprising (a) a source of palladium cations, (b) a mono-,

Art Unit: 1621

bi- or multidentate phosphine ligand, containing at least one phosphorus atom which is directly bound to two or three aliphatic carbon atoms, as process ligand to produce a palladium-phosphine ligand complex catalyst, and (c) a source of anions containing carboxylic acid, said process ligand (b) containing the moiety shown in formula (1) and the processing ligand is fed continuously or periodically into the process as ligand make-up, and a second phosphine ligand, different from the process ligand is fed continuously or periodically into the process as a make-up ligand and the second phosphine ligand is chosen so that the phosphonium salt is reversible under carbonylation condition.

The dependent claims further modify the process steps; limit the second phosphine ligand; and identify the reactants as specific conjugated diene, hydroxy groups and carboxylic acids.

8. Sielcken et al. teaches a process for the preparation of pentenoate ester by carbonylation of butadiene or butadiene derivative in the presence of carbon monoxide, an alcohol, a catalyst system comprising palladium, a carboxylic acid and a monodentate or multidentate phosphine ligand. (see Example I and columns 2-4, 6-8). Sielcken et al. discloses that when monodentate phosphine ligand is used the process is continuous or semi-continuous the amounts of reactants are substantially maintained during the whole process. (see column 2, lines 44-47). Additionally, Sielcken et al. discloses that multidentate phosphine ligands can be used interchangeably with monodentate in the reaction process, and the "R" groups of the multidentate are identical to those of the monodentate. (see column 4, lines 7-21). Additionally, Sielcken

Art Unit: 1621

et al. discloses that the catalyst system, containing the monodentate or multidentate phosphine ligand, is continuously fed to a reactor in a continuous process. (see column 7, lines 6-27).

Sielcken et al. fails to disclose the following: monitoring of the concentration and degradation rate of the process ligand; the second phosphine ligand has less coordination strength to the palladium; the use of 1,3-butadiene; carboxylic acids such as pivalic acid, monomethyladipate, and acetic acid; and the addition of the second phosphine ligand as make-up ligand to the process ligand before feeding to the reaction zone.

However, Drent (1) discloses a process for the carbonylation of a conjugated diene that has a catalyst system which includes a diphosphine ligand, the conjugated diene can be 1,3 butadiene and the carboxylic acids such as pivalic, monomethyladipate and acetic. (see pages 6, 7 and 11). Drent (1) teaches that a slight molar excess of ligand to palladium is used decrease ligand degradation or even to eliminate ligand degradation. Additionally, Drent (1) states that when performing the process of the invention with a slight excess of ligand to palladium, it will be preferred to monitor the concentration (and degradation ) of the ligand during the course of the process and **adds fresh ligand** in order to remain in the preferred ranges of operation. (see page 14, lines 16-27).

Drent (1) fails to disclose the second phosphine ligand has less coordination strength; and the addition of the second phosphine ligand as make-up ligand to the process ligand before feeding to the reaction zone.

However, Drent (2) discloses a process for preparing alkanedioic derivatives that involve the reaction of an aliphatic conjugated diene with carbon monoxide and a hydroxyl group, in the presence of a catalyst system comprising: a) a source of cationic palladium, b) a first bidentate diphosphine ligand having electron withdrawing substituents on the phosphorus atoms, c) a second bidentate diphosphine ligand having electron releasing substituents on the phosphorous atoms, and d) a source of an anion. The catalyst system of Drent (2) adds two different bidentate diphosphine ligands together prior to feeding to the reaction zone. Drent (2) states that the catalyst system used has improved stability. (see abstract, column 1, lines 64 – 68; column 2, lines 1-6, 22 – 24 & 65 – 68). According to Example 1, the first bidentate diphosphine and the second bidentate diphosphine are added prior to entry into the reaction zone containing the 1,3-butadiene and carbon monoxide.

As such, Sielcken et al. discloses carbonylation of a conjugated diene by a process that uses both a monodentate and multidentate phosphine ligand; and further in view of the teachings of Drent (1) and Drent (2) which both teach methods for carbonylation of a conjugated diene by a process that uses an aliphatic conjugated diene with carbon monoxide and a hydroxyl group-containing compound in the presence of a catalyst system that has process ligands that produce a palladium-phosphine ligand complex catalyst.

It would have been obvious to one skilled in the art to at the time the claimed invention was made to use the known technique as disclosed in Sielcken et al. and monitor the concentration level of the catalyst system as suggested by Drent (1) and

Art Unit: 1621

then tweak the process by adding to the catalyst system, a second and different phosphine ligand (second bidentate diphosphine ligand) to the processing phosphine ligand (first bidentate diphosphine ligand) in a continuous process, as suggested by Dent (2), prior to feeding the catalyst system into the reaction zone with the carbon monoxide and conjugated diene and obtain the desired results from the carbonylation reaction, to maintain the concentration level of the catalyst system to reduce the degradation path for the ligand.

Therefore, using a known technique of adding a second and different phosphine ligand to reaction process for carbonylation of a conjugated diene to reduce degradation in the catalyst system of Sielcken et al. would have been obvious to one of ordinary skill in the art. Variations of particular work available in one field of endeavor may be prompted by design incentives and other market forces, either in same field or different one, and if person of ordinary skill in art can implement predictable variation, 35 U.S.C. §103 likely bars its patentability; similarly, if particular technique has been used to improve one device, and person of ordinary skill would recognize that it would improve similar devices in same way, then using that technique is obvious. KSR International co. v. Teleflex Inc., 550 U.S. at \_\_\_\_\_, 82 USPQ2D 1385 (U.S. 2007).

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to YATE' K. CUTLIFF whose telephone number is (571)272-9067. The examiner can normally be reached on M-TH 8:30 a.m. - 5:00 p.m..



Art Unit: 1621

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yvonne Eyler can be reached on (571) 272 - 0871. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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